USER MANUAL

OPTION 9L

RS-422 Serial Interface Adapter

4Ax-602315-xUxx

November 1994

Single Source Machine Control *Power // Flexibility // Ease of Use*
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Table of Contents

INTRODUCTION **1**

INSTALLATION **3**

CONNECTORS **5**

JUMPERS **7**

OPERATION **9**

CONNECTOR PINOUTS **11**
JRS422 (26-Pin Connector) 11
JRS422 (DB-15 Connector) 12

JUMPERS **13**
E8: RS232 Converter Power Supply Control 13
E9 - E16: Serial Interface Handshake Control 13

INTRODUCTION

Option 9L for the PMAC-Lite replaces the standard RS-232 serial communications interface with an RS-422 interface. It consists of a small piggyback board that sits on top of the PMAC-Lite in the area of the J4 connector. Because the RS-422 interface uses differential line drivers and receivers, it permits greater noise immunity and longer cable lengths than RS-232. Because the drivers are tri-stated, this option permits the PMAC-Lite to be used with other PMAC-Lites or PMAC-PCs on a single daisy-chained serial cable (which is not possible with the standard RS-232 interface).

INSTALLATION

When Option 9L is ordered with the PMAC-Lite, the option board is installed onto the PMAC at the factory. If Option 9L is ordered for add-on to an existing PMAC-Lite, it may be possible to install as a field upgrade.

If IC U33 on the PMAC-Lite is soldered directly into the board and not socketed, it will not be possible to perform a field upgrade to install the option board. This is true of older versions of the PMAC-Lite; for these units, the PMAC must be returned to the factory for installation of Option 9L.

However, if IC U33 on the PMAC-Lite is socketed, a field installation is possible. The installation is very simple:

1. Remove ICs U33 and U38 from their sockets on the PMAC-Lite. These ICs will not be used when the Option 9L is installed; store them safely for possible future use.
2. Place the two provided screws through the holes on the PMAC-Lite so that the heads are on the back (solder) side of the board. Slide the provided spacers over the shafts of the bolts on the front side of the board.
3. Place the Option 9L board on the PMAC-Lite so that the prongs on the back fit into the sockets for U33 and U38.
4. Tighten the screws to secure the board.

CONNECTORS

Two connectors are provided on the Option 9L. Only one of these connectors may be used at a time, as selected by Jumper W2.

J1 provides the RS-422 signals on a 26-pin IDC male connector. This is the same connector as for the RS-422 port on the PMAC-PC. It is designed for a straight-across connection to a DB-25 connector for RS-232 or RS-422 on a host computer.

J2 provides the RS-422 signals on a DB-15 female connector. This connector is designed for straight-across connection to a DB-15 connector for RS-422 on a Fanuc system.

JUMPERS

Jumpers E9-E16 on the Option 9L permit the user to exchange, send, and receive lines for both data and handshaking. However, almost all users will keep the default configuration. When the Option 9L board is installed, these jumpers take the place of jumpers E9, E10, E13, and E14 on the PMAC-Lite itself, which are not used.

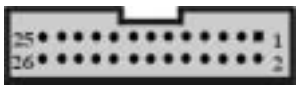
OPERATION

There is no difference in software operation between a PMAC-Lite with Option-9L and one without. The software is unaware of the difference in the signal driver voltages.

However, with the Option 9L, it is possible to use PMAC's serial daisy-chain capability on the PMAC-Lite with software card addressing. To specify which card is active on the daisy-chain, the host uses the **@n** command, where "**n**" is a hexadecimal digit specifying the card number. The card whose jumpers E40-E43 specify a card number matching "**n"** will be the active card on the chain, accepting commands, and capable of responding over the chain.

CONNECTOR PINOUTS

JRS422 (26-Pin Connector)



Front View

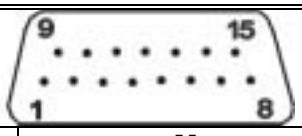
Pin #	Symbol	Function	Description	Notes
1	CHASSI	Common	PMAC Common	
2	S+5V	Output	+5Vdc Supply	Deactivated by "E8"
3	RD-	Input	Receive Data	Differential I/O Low True **
4	RD+	Input	Receive Data	Differential I/O High True *
5	SD-	Output	Send Data	Differential I/O Low True **
6	SD+	Output	Send Data	Differential I/O High True *
7	CS+	Input	Clear to Send	Differential I/O High True **
8	CS-	Input	Clear to Send	Differential I/O Low True *
9	RS+	Output	Request to Send	Differential I/O High True **
10	RS-	Output	Request to Send	Differential I/O Low True *
11	DTR	Bi-directional	Data Term Ready	Tied to "DSR"
12	INIT/	Input	PMAC Reset	Low is "RESET"
13	GND	Common	PMAC Common	**
14	DSR	Bi-directional	Data Set Ready	Tied to "DTR"
15	SDIO-	Bi-directional	Special Data	Differential I/O Low True
16	SDIO+	Bi-directional	Special Data	Differential I/O High True
17	SCIO-	Bi-directional	Special Control	Differential I/O Low True
18	SCIO+	Bi-directional	Special Control	Differential I/O High True
19	SCK-	Bi-directional	Special Clock	Differential I/O Low True
20	SCK+	Bi-directional	Special Clock	Differential I/O High True
21	SERVO-	Bi-directional	Servo Clock	Differential I/O Low True ***
22	SERVO+	Bi-directional	Servo Clock	Differential I/O High True ***
23	PHASE-	Bi-directional	Phase Clock	Differential I/O Low True ***
24	PHASE+	Bi-directional	Phase Clock	Differential I/O High True ***
25	GND	Common	PMAC Common	
26	+5V	Output	+5Vdc Supply	Power Supply Out

The JRS422 connector provides the PMAC with the ability to communicate both in RS422 and RS232. This connector is also used to daisy chain interconnect multiple PMACs for synchronized operation.

* Required for communications to an RS-422 host port
** Required for communications to an RS-422 or RS-232 host port
*** Output on card @0; input on other cards. These pins are for synchronizing multiple PMACs together by sharing their phasing and servo clocks. The PMAC designated as card 0 (@0) by its jumpers E40-E43 outputs its clock signals. Other PMACs designated as cards 1-15 (@1-@F) by their jumpers E40-E43 take these signals as inputs. If synchronization is desired, these lines should be connected even if serial communications is not used.

See Also:
Serial Communications
Synchronizing PMAC to other PMACs

JRS422 (DB-15 Connector)

Top View 

Pin #	Symbol	Function	Description	Notes
1	CHASSI	Common	PMAC Common	
2	N.C.	None	No Connect	
3	N.C.	None	No Connect	
4	N.C.	None	No Connect	
5	S+5V	Output	+5VDC Supply	Deactivated by E8
6	RS-	Output	Request to Send	Differential I/O Low True *
7	GND	Common	PMAC Common	**
8	CS+	Input	Clear to Send	Differential I/O High True **
9	N.C.	None	No Connect	
10	RD-	Input	Receive Data	Differential I/O Low True **
11	RD+	Input	Receive Data	Differential I/O High True *
12	SD-	Output	Send Data	Differential I/O Low True **
13	SD+	Output	Send Data	Differential I/O High True *
14	RS+	Output	Request to Send	Differential I/O High True **
15	CS-	Input	Clear to Send	Differential I/O Low True *

The JRS422 connector provides the PMAC with the ability to communicate both in RS422 and RS232. It does not permit the daisy chaining of multiple PMACs.

JUMPERS

E8: RS232 Converter Power Supply Control

E-Point & Physical Layout	Physical Layout	Description	Default
E8		Jump pin 1 to 2 to apply +5V to "J2" pin 2 (JRS422); this can be used to power optional RS422 to RS232 converter module which requires +5V for operation.	Jumper installed

E9 - E16: Serial Interface Handshake Control

E-Point & Physical Layout	Description	Default
E9 E10	Jump, E9-1 to E9-2 to allow 'RD-' to be input on J2-3; jump E10-1 to E10-2 to allow 'SD-' to be output on J2-5 Jump E9-1 to E10-1 to allow 'RD-' to be output on J2-3; jump E9-2 to E10-2 to allow 'SD-' to be input on J2-5	E9 1-2 Jumper installed E10 1-2 Jumper installed
E11 E12	Jump E11-1 to E11-2 to allow 'RD+' to be input on J2-4; jump E12-1 to E12-2 to allow 'SD+' to be output on J2-6 Jump E11-1 to E12-1 to allow 'RD+' to be output on J2-4; jump E11-2 to E12-2 to allow 'SD+' to be input on J2-6	E11 1-2 Jumper installed E12 1-2 Jumper installed
E13 E14	Jump E13-1 to E13-2 to 1-2 allow CS-' to be input jumper on J2-7; jump E14-1 to installed E14-2 to allow 'RS-' to be output on J2-9 Jump E13-1 to E14-1 to allow 'CS-' to be output on J2-7; jump E14-2 to E14-2 to allow 'RS-' to be input on J2-9	E13 1-2 Jumper installed E14 1-2 Jumper installed
E15 E16	D5 jump E15-1 to E15-2 to allow 'CS+' to be input on J2-8 Jump E16-1 to E16-2 to allow 'RS+' to be output on J2-10 Jump E15-1 to E16-1 to allow 'CS+' to be output on J2-8; jump E15-2 to E16-2 to allow 'RS+' to be input on J2-10	E15 1-2 Jumper installed E16 1-2 Jumper installed
E9 to E16 jumpers control various configurations of RS422/RS232 handshake signal setup.		

E-Point & Physical Layout	Description	Default
W1	Jump pin 1 to 2 to configure the interface for RS-485 (not yet supported by software). Jump pin 2 to 3 to configure the interface for RS-422.	2-3 Jumper installed
W2	Jump pin 1 to 2 to configure the board to use connector J2 (DB-15) Jump pin 2 to 3 to configure the board to use connector J1 (IDC-26)	2-3 Jumper installed